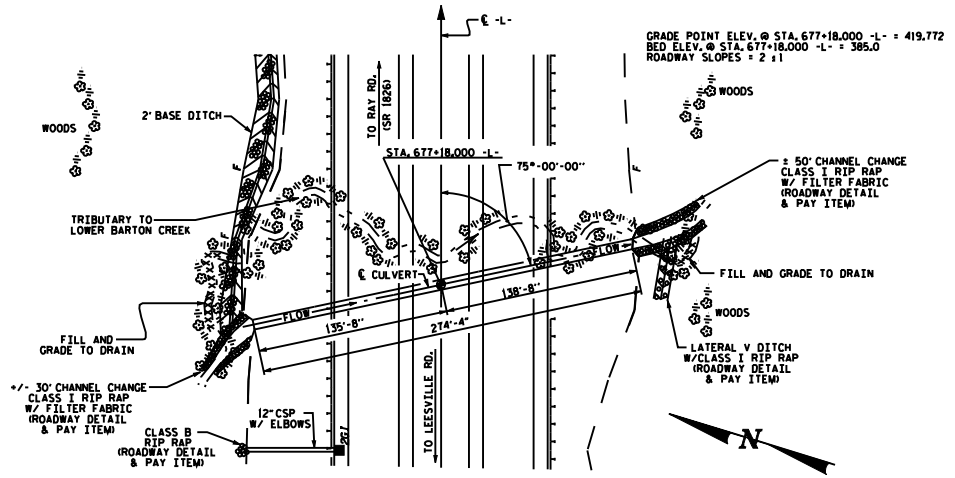
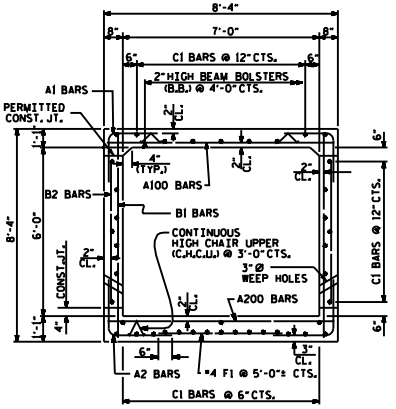
FIGURE 9 - 4

BENCH MARK #29: ELEV. 401.81; SPIKE IN 24" OAK 5' RIGHT OF -L- STA. 679+71.000



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.



RIGHT ANGLE SECTION OF BARREL

THERE ARE 41 "C" BARS IN SECTION OF BARREL.

NOTES

ASSUMED LIVE LOAD ----------HS20-44 OR ALTERNATE LOADING.

DESIGN FILL----------30.00'

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 3½" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEETS.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE THE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

THE CONTRACTOR MAY CHOOSE TO CONSTRUCT A CAST-IN-PLACE CULVERT IN ACCORDANCE WITH THE INCLUDED PLANS AT NO ADDITIONAL COST TO THE DEPARTMENT. THE CONTRACT REQUIREMENTS WITH RESPECT TO CONSTRUCTION STAGING AND TIME SHALL BE SATISFIED REGARDLESS OF WHETHER A PRECAST OR CAST-IN-PLACE CULVERT IS CONSTRUCTED.

FOR CULVERT DIVERSION CHANNEL DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE THIRTY INCH SAMPLE OF EACH SIZE BAR IS USED. AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO THIRTY INCH SAMPLES OF EACH SIZE BAR ARE USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLES, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS.

FOR EROSION CONTROL PLANS, SEE ROADWAY PLANS.

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			
MAIN BARREL @ .892	CY/FT	129.9	C.Y.
WINGS ETC.		16.2	C.Y.
TOTAL		146.1	C.Y.
REINFORCING STEEL			
BARREL		20591	LBS.
WINGS ETC.		926	LBS.
TOTAL		21517	LBS.
FOUNDATION CONDITIONING MATERIAL		TONS 163	
CULVERT EXCAVATION = LUMP SUM			

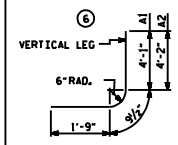
OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE _____ = N/A
FREQUENCY OF OVERTOPPING FLOOD _ = 500 YR.
OVERTOPPING FLOOD ELEVATION _____ = N/A

HYDRAULIC DATA

DESIGN DISCHARGE _____ = 500 CFS
FREQUENCY OF DESIGN FLOOD _____ = 50 YR.
DESIGN HIGH WATER ELEVATION _____ = 394.16
DRAINAGE AREA _____ = 300 AC
BASIC DISCHARGE (Q100) _____ = 600 CFS
BASIC HIGH WATER ELEVATION _____ = 395.70

BAR TYPES



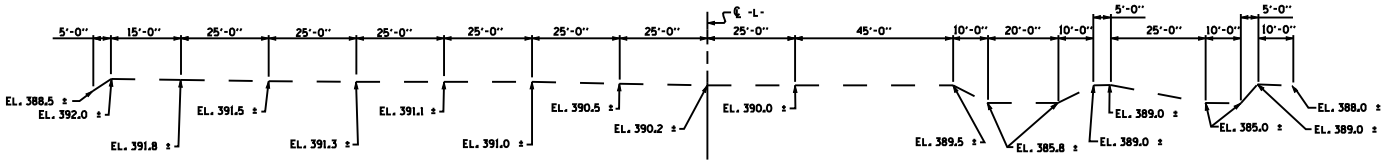
ALL BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
B1	4	1'-9"
C1	4	1'-11"

REINFORCING STEEL BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	444	#5	6	5'-10"	2701
A2	444	#5	6	5'-11"	2740
A101	33	#5	STR	7'-9"	2676
A101	6	#5	STR	5'-6"	34
A102	6	#5	STR	3'-2"	20
A200	33	#5	STR	7'-9"	2676
A201	6	#5	STR	5'-6"	34
A202	6	#5	STR	3'-2"	20
B1	296	#4	STR	25'-8"	5075
C1	246	#4	STR	25'-8"	4218
F1	29	#4	STR	4'-3"	82
G1	4	#4	STR	9'-1"	24
S2	12	#8	STR	9'-1"	291
REINFORCING STEEL				= 20591 lb	



PROFILE ALONG ℄ CULVERT

PROJECT NO. EXAMPLE

_____ COUNTY

STATION: _____

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

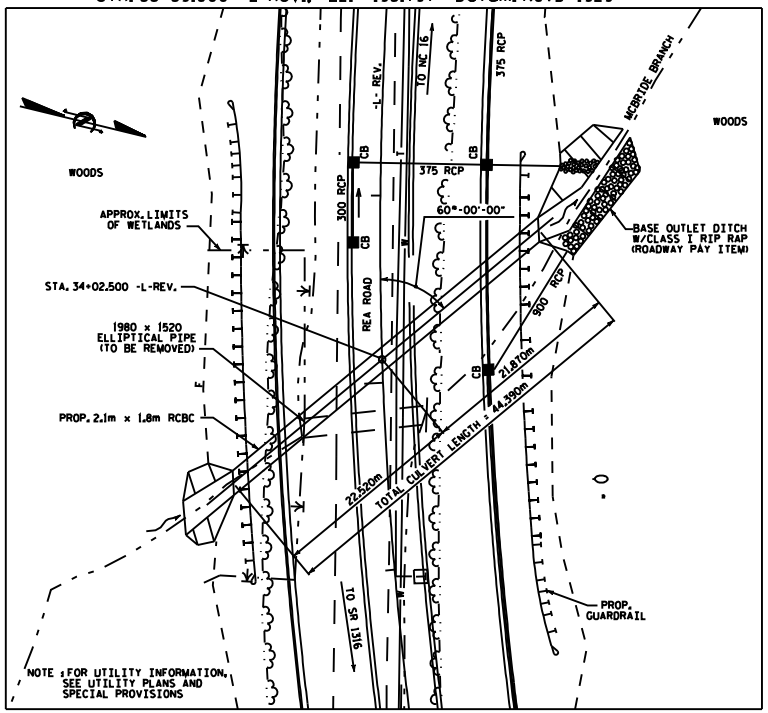
SINGLE BARREL 7 FT. X 6 FT. CONCRETE BOX CULVERT 75° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
						TOTAL SHEETS

DRAWN BY : _____ DATE : _____
CHECKED BY : _____ DATE : _____

FIGURE 9 - 4 M

BENCH MARK IS RR SPIKE IN 900mm OAK, 32m LT.
STA. 33+39.000 -L-Rev., EL.= 195.797 Datum: NGVD 1929



LOCATION SKETCH

HYDROGRAPHIC DATA

GRADE POINT EL. @ STA. 34+02.500 -L-REV.	= 195.594
BED ELEVATION @ STA. 34+02.500 -L-REV.	= 192.805
ROADWAY SLOPES	= 2:1
DESIGN DISCHARGE	= 9.24m³/s
FREQUENCY OF DESIGN FLOOD	= 50Yrs.
DESIGN HIGH WATER ELEVATION	= 195.25
DRAINAGE AREA	= 59 Ha.
BASIC DISCHARGE (0100)	= 10.91m³/s
BASIC HIGH WATER ELEVATION	= 195.43

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 14.73+m³/s
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YRS.
OVERTOPPING FLOOD ELEVATION	= 196.04

NOTES:

ASSUMED LIVE LOAD ----------MS18 OR ALTERNATE LOADING.

DESIGN FILL----------10.24m

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

76mm Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 100mm OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

FOR CULVERT DIVERSION CHANNEL DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.

FOR EROSION CONTROL PLANS, SEE ROADWAY PLANS.

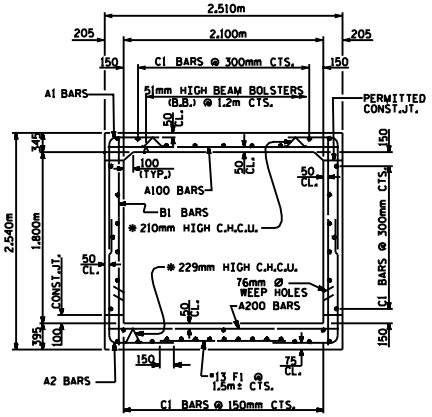
DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 21.0m. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACES OF EXTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

THE CONTRACTOR MAY CHOOSE TO CONSTRUCT A CAST-IN-PLACE CULVERT IN ACCORDANCE WITH THE INCLUDED PLANS AT NO ADDITIONAL COST TO THE DEPARTMENT. THE CONTRACT REQUIREMENTS WITH RESPECT TO CONSTRUCTION STAGING AND TIME SHALL BE SATISFIED REGARDLESS OF WHETHER A PRECAST OR CAST-IN-PLACE CULVERT IS CONSTRUCTED.

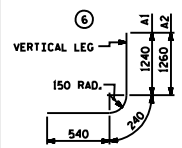
THE EXISTING STRUCTURE CONSISTING OF 1.98m x 1.52m STRUCTURAL PLATE ELLIPTICAL PIPE WITH CONCRETE HEADWALLS AND LOCATED AT PROPOSED SITE SHALL BE REMOVED.



RIGHT ANGLE SECTION OF BARREL
THERE ARE 41 "C" BARS IN SECTION OF BARREL.

* ALL CONTINUOUS HIGH CHAIR UPPER (C.H.C.U.) @ 900mm CTS.

BAR TYPES



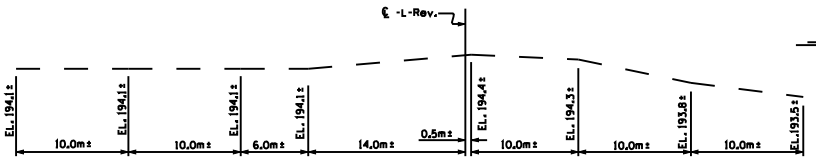
ALL BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
B1	13	540
C1	13	590

REINFORCING STEEL BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	444	#16	6	2020	1392
A2	444	#16	6	2040	1406
A101	331	#16	STR	2360	1212
A101	6	#16	STR	1660	15
A102	6	#16	STR	960	9
A200	331	#16	STR	2360	1212
A201	6	#16	STR	1660	15
A202	6	#16	STR	960	9
B1	296	#13	STR	2360	694
C1	246	#13	STR	7820	1912
F1	29	#13	STR	1300	37
G1	4	#13	STR	2760	11
S2	12	#25	STR	2760	132
REINFORCING STEEL				=	8056 KG



PROFILE ALONG ℄ CULVERT

METRIC

PROJECT NO. EXAMPLE

COUNTY

STATION:

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD SINGLE 2.1m X 1.8m CONCRETE BOX CULVERT 60° SKEW

ASSEMBLED BY :		DATE :
CHECKED BY :		DATE :
DRAWN BY : EEM	6/97	
CHECKED BY : ARB	7/97	

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

STD. No. CBI60SM